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PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 30 August 2000 (30.08.00)	Applicant's or agent's file reference P/23232.WO/CJW
International application No. PCT/GB00/00059	
International filing date (day/month/year) 12 January 2000 (12.01.00)	Priority date (day/month/year) 13 January 1999 (13.01.99)
Applicant BRASSINGTON, Anthony, William	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

10 August 2000 (10.08.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Olivia TEFY

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)


Applicant's or agent's file reference P/23232.WO/CJW	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00059	International filing date (day/month/year) 12/01/2000	Priority date (day/month/year) 13/01/1999
International Patent Classification (IPC) or national classification and IPC B65D90/08		
Applicant SEA CONTAINERS SERVICES LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 12 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 10/08/2000	Date of completion of this report 11.04.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Philippon, D Telephone No. +49 89 2399 2617



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00059

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*)

Description, pages:

1	as originally filed			
2-9	as received on	11/01/2001	with letter of	08/01/2001

Claims, No.:

1-5	as received on	11/01/2001	with letter of	08/01/2001
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Drawings, sheets:

1/4-4/4	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00059

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-5
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-5
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-5
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00059

Item I

1. The amendments filed with the letter dated 08/01/2001 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT:
 - 1.1. The feature introduced into claim 1 that the first return member is arranged at a location of the third portion remote from the angled second portion is broader in scope that the originally disclosed feature (see originally filed claim 3 and page 6, lines 19-22) that the return member is arranged at an edge of the third portion remote from the angled portion.
 - 1.2. The feature introduced into claim 1 that the second return member is arranged at a location remote from the angled second portion is not supported by the originally disclosed feature that the second return member (called web 6 in the description) is located proximate a junction between the vertical portion and the angled portion (see page 6, line 23 to page 7, line 1).
2. The same applies to the amendments in claim 3 for a container (corresponds to originally filed claim 5) and in claim 5 for a method (corresponds to originally filed claim 9).
3. This report, in particular Item V of this report, has been established as if these amendments had not been made (Rule 70.2(c)PCT) and had been replaced by the corresponding disclosed features.

Item V

3. A top rail according to the pre-characterising part of claim 1 is known from D1 = GB-A-2 019 363.

This rail has been improved by the provision of the first and second return members according to the characterising portion (see item I above). There is no hint in the available prior art to modify the rail disclosed in D1 in the claimed manner. The subject-matter of claim 1 thus involves an inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00059

For the same reasons also the subject-matter of claims 3 and 5 involves an inventive step (Article 33 PCT).

4. Claims 2 and 4 are dependent on claims 1 and 3 respectively and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Item VII

5. The objections based on Article 34(2)(b) PCT raised in point I above apply equally to the corresponding parts of the description.
6. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P/23232.WO/CJW	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 00059	International filing date (day/month/year) 12/01/2000	(Earliest) Priority Date (day/month/year) 13/01/1999
Applicant SEA CONTAINERS SERVICES LTD. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 00/00059

Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

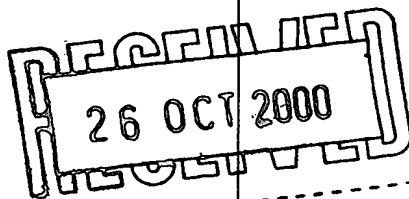
A top rail (100) for an insulated double-skinned freight container having a chamfered right-angle transverse cross-section and being adapted to be welded to at least one of an outer skin (11) of the side panel (12) and outer skin (18) of the roof panel. An insulated freight container having such a top rail (1) and a method of manufacturing an insulated container having such a top rail (1) are also disclosed.

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BAILLIE, Iain C. et al.
LANGNER PARRY
52-54 High Holborn
London WC1V 6RR
GRANDE BRETAGNE



PCT

WRITTEN OPINION

(PCT Rule 66)

Applicant's or agent's file reference P/23232.WO/CJW		Date of mailing (day/month/year)	24.10.2000
International application No. PCT/GB00/00059		International filing date (day/month/year)	12/01/2000
		Priority date (day/month/year)	13/01/1999
International Patent Classification (IPC) or both national classification and IPC B65D90/08			
Applicant SEA CONTAINERS SERVICES LTD. et al.			

- This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
- This opinion contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain document cited
 - ☒ Certain defects in the international application
 - ☐ Certain observations on the international application
- The applicant is hereby **invited to reply** to this opinion.

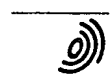
When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
- The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 13/05/2001.

Name and mailing address of the international preliminary examining authority:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Philippon, D

Formalities officer (incl. extension of time limits)

Berger, K

Telephone No. +49 89 2399 2576



WRITTEN OPINION

International application No. PCT/GB00/00059

I. Basis of the opinion

1. This opinion has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed").*:

Description, pages:

1-9 as originally filed

Claims, No.:

1-9 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1,5
Inventive step (IS)	Claims 9
Industrial applicability (IA)	Claims

2. Citations and explanations

see separate sheet

WRITTEN OPINION

International application No. PCT/GB00/00059

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

POINT V

1. The insulated double-skinned freight container disclosed in D1 = GB-A-2 019 363 comprises an element called in D1 "frame 1" (see figures 1 and 1a) which can be considered as being a "top rail" within the meaning of claim 1.

D1 thus discloses a top rail 1 for an insulated double-skinned freight container, the rail forming a junction between an outer skin 2 of a side wall and an outer skin 2 of a roof panel of the container, wherein the rail 1 comprises a first portion for attachment to the side wall (see the lower end of the rail in figures 1 and 2), an angled second portion at a first obtuse angle to the first portion adapted to be angled inwardly of the container in use and a third portion for attachment to the roof panel angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion.

In D1 the rail is screwed to the outer skins of the side panel and of the roof panel. It is however clear for the person skilled in the art that if said outer skins were made of metal sheet (instead of ply wood as in D1) another way of fixing them could and would be envisaged, in particular welding.

The rail is consequently also adapted to be welded (i.e. no structural modification of the rail is necessary therefore) to at least one of the outer skin of the side panel and the outer skin of the roof panel.

The subject-matter of claim 1 is thus not new (Article 33 PCT).

2. For the same reasons the subject-matter of claim 5 for a freight container is not new.
3. The subject-matter of claim 9 for a method lacks an inventive step in the light of the available prior art and the general knowledge of the skilled person: the top rail used in the claimed method is known from D1 as already explained above in relation with claim 1, and the claimed steps are the normal steps a person skilled in the art would carry out for manufacturing an insulated freight container of a known type and comprising such a top rail.

4. The dependent claims 2-4 and 6-8 concern features which are well known in the art or which are adaptations falling within the scope of ordinary practice followed by the skilled person, such that these claims do not appear to contain any additional features which involve an inventive step when combined with the subject matter of any claim to which they refer.

POINT VII

5. Should the applicant regard some particular matter as suitable to serve as a basis for a new claim which would satisfy the criteria set forth in Article 33(1) PCT an independent claim including such particular matter should be filed. The applicant should also indicate in the letter of reply the difference vis-à-vis the state of the art and the significance thereof.

The description must be brought into conformity with the new claims to be filed (Rule 5.1 (a) (iii) PCT).

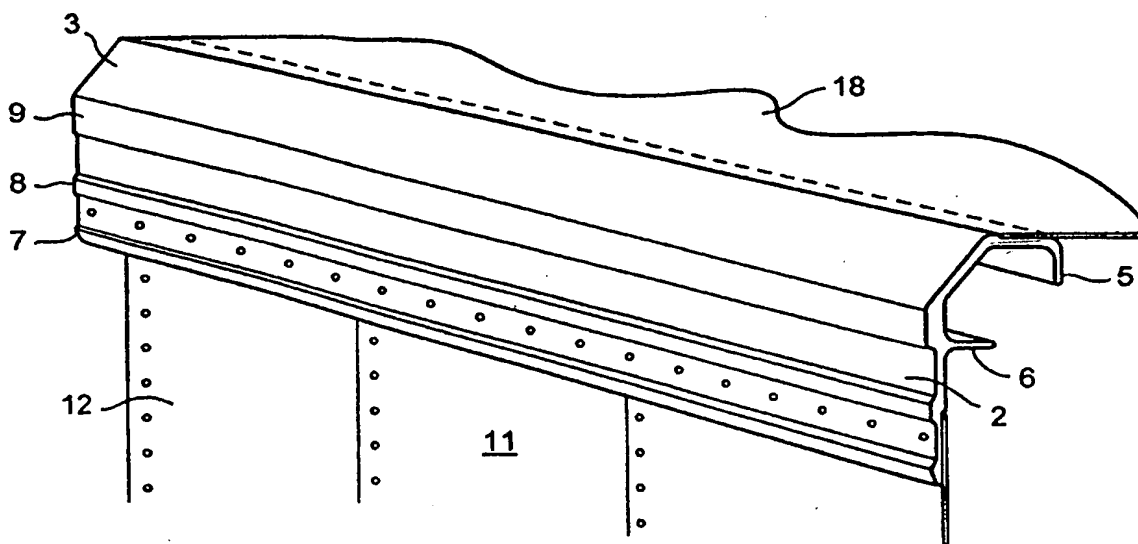
To meet the requirements of Rule 6.3 (b) PCT the independent claim should be properly cast in a two-part form, with those features which in combination are part of the nearest prior art (see document D1) being placed in the first part.

According to Rule 6.2 (b) PCT technical features mentioned in the claims should be provided with reference signs in parentheses. This applies to both the preamble and the characterising portion.

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : B65D 90/08	A1	(11) International Publication Number: WO 00/41952 (43) International Publication Date: 20 July 2000 (20.07.00)
(21) International Application Number: PCT/GB00/00059 (22) International Filing Date: 12 January 2000 (12.01.00) (30) Priority Data: 9900701.5 13 January 1999 (13.01.99) GB (71) Applicant (for all designated States except US): SEA CONTAINERS SERVICES LTD. [GB/GB]; Sea Containers House, 20 Upper Ground, London SE1 9PF (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): BRASSINGTON, Anthony, William [GB/GB]; Sea Containers House, 20 Upper Ground, London SE1 9PF (GB). (74) Agents: BAILLIE, Iain, C. et al.; Langner Parry, 52-54 High Holborn, London WC1V 6RR (GB).		(81) Designated States: CN, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: INSULATED FREIGHT CONTAINER AND A TOP RAIL THEREFOR



(57) Abstract

A top rail (100) for an insulated double-skinned freight container having a chamfered right-angle transverse cross-section and being adapted to be welded to at least one of an outer skin (11) of the side panel (12) and an outer skin (18) of the roof panel. An insulated freight container having such a top rail (1) and a method of manufacturing an insulated container having such a top rail (1) are also disclosed.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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INSULATED FREIGHT CONTAINER AND A TOP RAIL THEREFOR

This invention relates to an insulated freight container and to a top rail therefor.

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A known insulated freight container has an inner and outer skin with an interstitial space between the skins filled with an insulating solidified foam. The outer skin is typically of aluminium and the inner skin of stainless steel. The outer roof skin and outer side skin are connected together by an extruded top rail. As shown in figure 1, the top rail 100 has a transverse cross-sectional shape similar to a query mark. A vertical portion 102 of the rail 100 is riveted to the outer side skin 110 before the container is fully assembled and before the interstitial spaces 111 are completely filled with foam 115. As is evident from figure 1, an upper portion 104 of the rail 100 is oriented outwards of the container in order that both sides of this portion 104 are accessible for riveting the outer skin of a roof panel 118 to the rail 100 after the rail is riveted to the outer side skin 110.

20

However, the above container has a number of disadvantages. The fixing of rivets 120 is labour intensive and time consuming and apertures necessary for the rivets 120 tend to weaken the roof panel 118. As a result, the roof panel 118 may tear or buckle allowing the ingress of water into the interstitial space 111 and thereby destroy the insulating property of the foam 115. Moreover, the rivet holes tend to elongate as the container flexes, again allowing the ingress of water. In

addition, the protruding upper portion 104 of the rail 100 is liable to damage in collision with other containers during the stacking of containers. Despite these difficulties, there is a strong prejudice in the art towards the riveting of panels to rails, in particular, in the case of aluminum rails and panels.

5

It is an object of this invention to provide an improved top rail for an insulated freight container and an improved method of manufacturing such a freight container.

10 According to one aspect of this invention there is provided a top rail for an insulated double-skinned freight container, the rail in use forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, said top rail comprising a first portion for attachment to the side wall, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly
15 of the container in use, and a third portion for attachment to the roof panel angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer skin of the roof panel.

20 Advantageously, the rail is made of aluminium.

Conveniently, the top rail has a return section substantially perpendicular to the third portion at an edge of the third portion remote from the angled portion, the

return section being adapted to be disposed inwardly of the container in use.

Advantageously, the first obtuse angle is between 140 degrees and 160 degrees.

5 Advantageously, the top rail has a web perpendicular to the first portion and attached to the first portion, the web being adapted to be disposed inwardly of the container in use.

Conveniently, an outer surface of the third portion is provided with a
10 longitudinal bead against which the outer skin of the roof panel abuts to provide a welding edge.

According to a second aspect of this invention, there is provided an insulated freight container having a top rail, the top rail forming a junction between an outer
15 skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the side wall, an angled second portion which is angled at a first obtuse angle to the first portion and angled inward of the container, and a third portion attached to the roof and angled at a second obtuse angle to the angled portion so that the third portion is substantially
20 perpendicular to the first portion and the rail is welded to at least one of the outer skin of the side panel and the outer skin of the roof panel.

Conveniently, the rail and/or the outer skin of the side panel and/or the outer skin of the roof panel are of aluminium.

Advantageously, the top rail has a return section substantially perpendicular to the third portion located at an edge of the third portion remote from the angled portion and disposed inwardly of the container.

5

Advantageously, the top rail has a web perpendicular to the first portion and attached to the first portion, the web being adapted to be disposed inwardly of the container in use.

10 Conveniently, the first obtuse angle is between 140 degrees and 160 degrees.

According to a third aspect of the present invention there is provided a method of manufacturing an insulated double-skinned freight container comprising the steps of:

- 15 a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of a floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,
- d) providing outer and inner skins of side panels, locating the inner skins
- 20 parallel to the respective outer skin and spaced from them by foam spacing stanchions, inserting foam between the inner and outer skins,
- e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling with foam joints between the floor panel and side panels,

- f) providing top rails having a first portion for attachment to each side wall respectively, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to a roof panel, angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion,
- g) riveting said top rails to the outer skins of the side walls respectively, fixing with a known method an inner skin of the roof panel to the inner skins of the side walls respectively,
- h) welding an outer skin of the roof panel to the third portion of the top rail and filling the space between the inner and outer skins of the roof panel with foam.

The rail of the present invention has the advantage of providing added strength and providing greater protection to the top rail from impact damage than rails of the prior art since the rail has no protruding portion. The top rail of the invention also has a smaller total cross section area than the rails of the prior art, but with the material concentrated where the greatest strength is required, i.e. on the angled section. The use of a welded joint also avoids weakening the outer skin by riveting, and reduces the likelihood of the ingress of water into the insulation foam.

The invention will now be described by way of example with reference to the accompanying drawing in which ;

Figure 1 shows a prior art transverse cross-section of a top rail installed in a

container,

Figure 2 shows a transverse cross-section of a top rail according to the invention, installed in a container,

Figure 3 shows a perspective view of the top rail of Figure 2 installed in a
5 container,

Figure 4 shows a transverse cross-section of an alternative embodiment of the top rail according to the invention installed in a container,

Figure 5 shows an enlarged view of a transverse cross-section of the top rail of Figures 2 & 3, and

10 Figure 6 shows an enlarged view of a transverse cross-section of the top rail of Figure 4.

In the figures like reference numerals denote like parts.

The top rail 1 shown in transverse cross-section in Figure 2 has a first
15 vertical portion 2, a second angled portion 3 angled inwards of the container in use at an angle α of 150 degrees to the first portion and third horizontal portion 4 connected at an angle β of 120 degrees of the angled portion 3 and oriented at right angles to the vertical portion 2. The first, second and third portions 2, 3, 4 of the rail 1 thereby form a chamfered right angle. The third portion 4 is provided with a
20 return portion 5 connected by an edge of the return portion 5 to an edge of the third portion 4 remote from the second angled portion 3, the return portion 5 being at right angles to the third portion 4 and inward of the container in use.

The vertical portion 2 is provided with a web 6 perpendicular to the vertical portion 2 and located on the vertical portion 2 proximate a junction between the

vertical portion 2 and the angled portion 3 and inward of the container in use.

As can be seen in the enlarged drawings of figures 5 or 6, the vertical portion 2 is further provided with lower, median and upper horizontal ribs 7, 8, 9, at upper and lower edges of the portion 2 and substantially along a median line of the portion 2 on an outer surface of the rail 1. The inner surface of the vertical section 2 is provided with a cut-away portion 10 extending substantially from a position opposite the lower rib 7 to a position opposite the median rib 8, for receiving an outer skin 11 of a side panel 12.

The third portion 4 may also be provided with a longitudinal bead 13, raised above an outer surface of the portion 4 at a junction between the portion 4 and the angled portion 3.

In the manufacture of a freight container using the top rail 1 of the invention, the floor and side panels are constructed from inner and outer skins 16, 11 with foam 15 in the interstitial space between the skins in a manner known per se, the inner and outer skins being placed parallel with each other, separated by foam stanchions and the interstitial space being injected with foam 15 so that the inner and outer skins 16, 11 are held together by the foam 15 when the foam sets. The top rail 1 is riveted to the outer skin 11 of the side panel 12, the outer skin 11 of the side panel 12 being accommodated in the cut-away 10 in the inner surface of the vertical section 2. An inner skin 17 of the top panel 14 is attached to the inner skin 16 of the side panels in a known manner and the outer skin 18 is welded to the top rail 1

by a weld bead 20 or with an edge of the outer skin 18 abutting the longitudinal bead 13 where present, secured by a weld bead 19, with the outer skin 18 partially overlapping the horizontal section 4. The interstitial space between the outer and inner skins 18, 17 of the top panel 14 is injected with foam 15 so that the return
5 portion 5 of the top rail 1 and the web 6 are embedded in the set foam 15.

Although it is normally more efficient to weld the top panel 14 to the rail 1, it will be understood that the outer skin of the top panel 14 could be riveted to the rail 1 and the outer skin 11 of the side panel 12 welded to the rail 1, or both panels
10 12 and 14 could be welded to the rail 1. Instead of welding, a suitable adhesive may be used.

The return section 5 and the web 6 impart strength to the rail 1 in axial twisting so that the rail 1 according to the invention is stronger than the rails of the
15 prior art in relation to flexing in a vertical direction and equally strong in respect of axial twisting. The web 6 also forms a convenient boundary for an initial insertion of foam within the side wall before the top panel is assembled to the rail, and a final foaming of the corner between the side wall and the top panel. In addition, the web 6 facilitates molding in the manufacture of the rail 1.

20

A second embodiment of the invention is shown in the transverse cross-section in Figure 4, in this embodiment the portion 4 is not provided with a bead and the weld bead 20 overlaps the edge of the outer skin of the top panel, the top

panel partially overlapping the portion 4 of the rail 1.

The strengthening ribs 7,8,9 of the vertical portion 2 provide strength against side impacts and the angled portion 3 of the rail assists in glancing off impacting
5 containers in collisions during stacking.

The total cross-sectional area of the rail of the invention is less than the total cross-section area of rails of the prior art and therefore less material is used in the construction of the rail and yet the strength is concentrated in the angled section
10 where damage is mostly likely to occur. Additional strength is provided by the strengthening ribs 7,8,9 on the vertical section 2 and by the web 6 and the return portion 5.

CLAIMS:

1. A top rail for an insulated double-skinned freight container, the rail being for forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to
5 the side wall, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to the roof panel angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer
10 skin of the roof panel.
2. A top rail as claimed in claim 1, wherein the rail is made of aluminium.
3. A top rail as claimed in claims 1 or 2, wherein the top rail has a return
15 section substantially perpendicular to the third portion at an edge of the third portion remote from the angled portion, the return section being adapted to be disposed inwardly of the container in use.
4. A top rail as claimed in any of the preceding claims, wherein the first obtuse
20 angle is between 140 degrees and 160 degrees.
5. An insulated freight container having a top rail, the top rail forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the side wall,

an angled second portion which is angled at a first obtuse angle to the first portion and angled inward of the container and a third portion attached to the roof and angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion and the rail is welded to at least one of
5 the outer skin of the side panel and the outer skin of the roof panel.

6. An insulated freight container as claimed in claim 5, wherein the rail and/or the outer skin of the side panel and/or the outer skin of the roof panel are of aluminium.

10

7. An insulated freight container as claimed in claim 5 or 6, wherein the top rail has a return section substantially perpendicular to the third portion located at an edge of the third portion remote from the angled portion and disposed inwardly of the container.

15

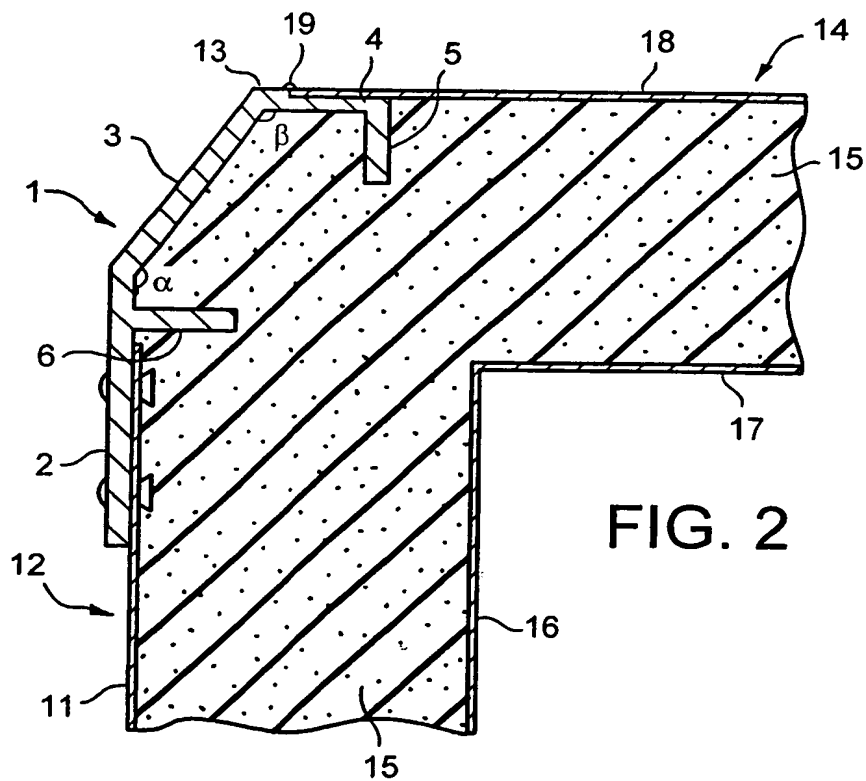
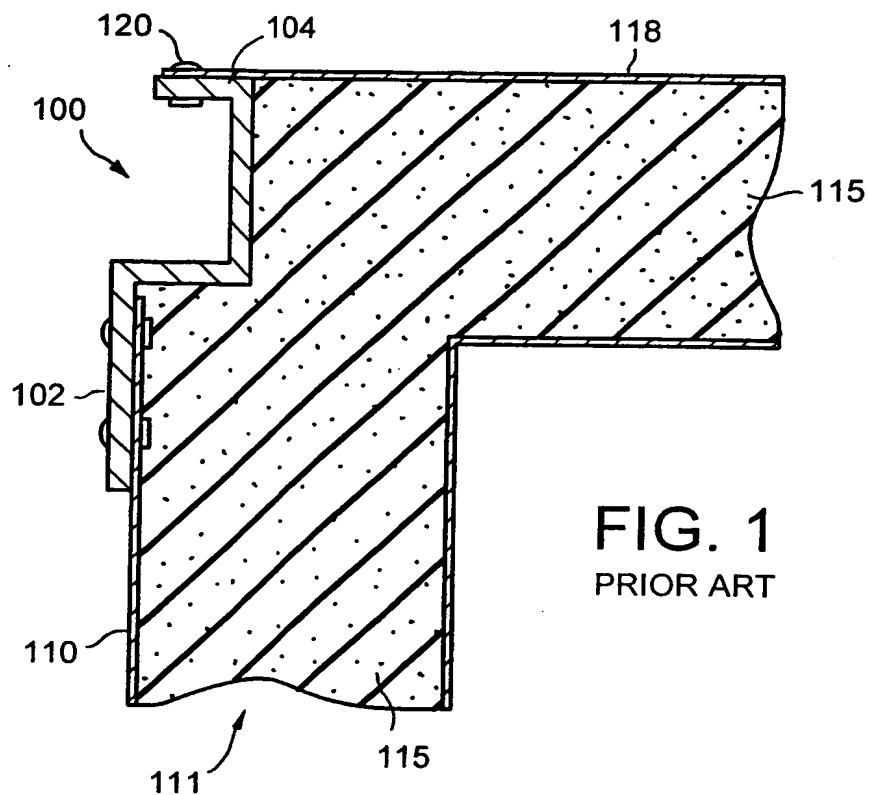
8. An insulated freight container as claimed in any of the claims 5 to 7, wherein the first obtuse angle is between 140 degrees and 160 degrees.

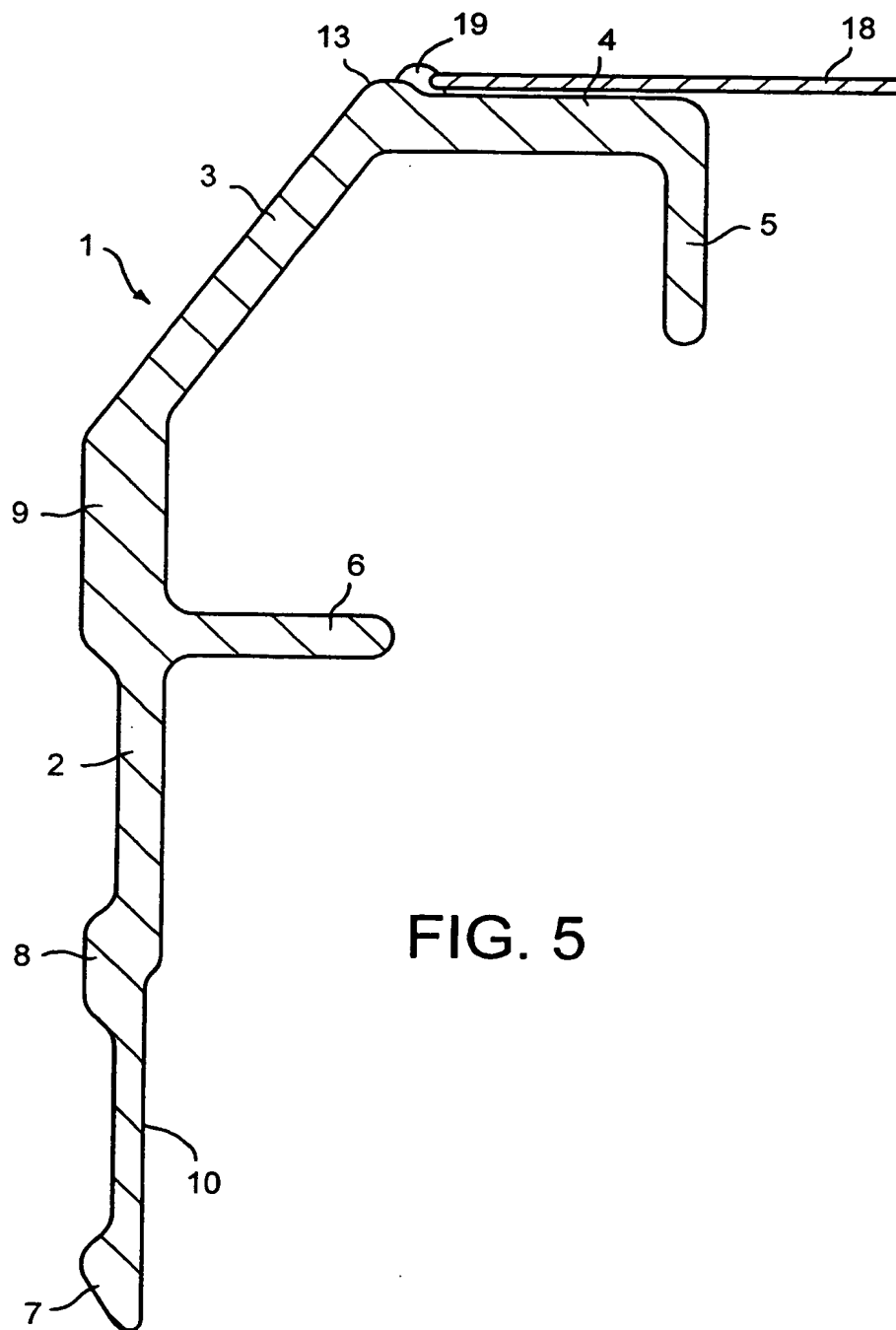
9. A method of manufacturing an insulated double-skinned freight container
20 comprising the steps of:

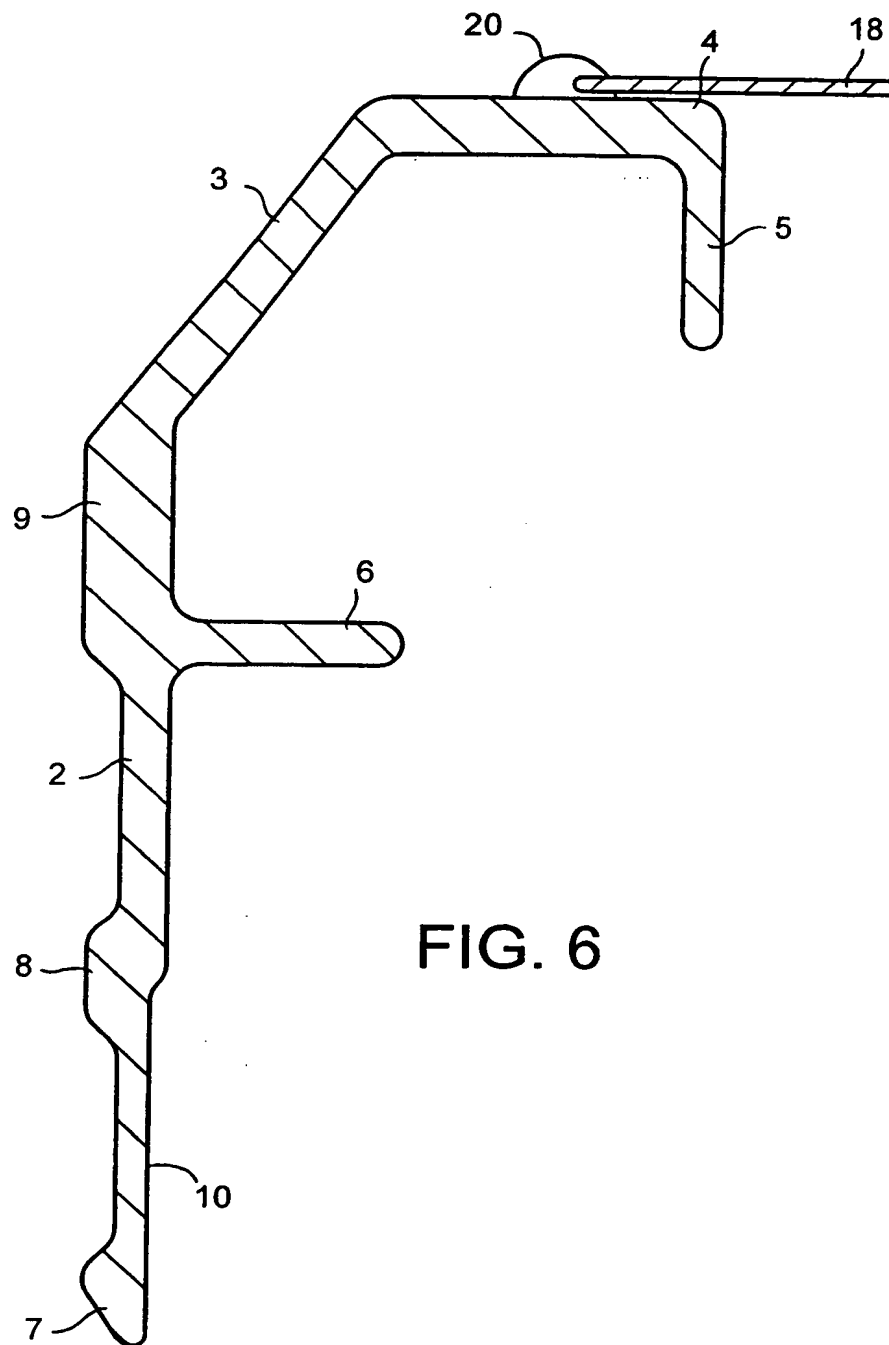
- a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of the floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,

- d) providing outer and inner skins of side panels, locating the inner skins parallel to the respective outer skin and spaced from them by foam spacing stanchions, inserting foam between the inner and outer skins,
- e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling with foam joints between the floor panel and side panels,
- f) providing top rails having a first portion for attachment to each side wall respectively, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to a roof panel, angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion,
- g) riveting said top rails to the outer skins of the side walls respectively, fixing with a known method an inner skin of the roof panel to the inner skins of the side walls respectively,
- h) welding an outer skin of the roof panel to the third portion of the top rail and filling the space between the inner and outer skins of the roof panel with foam.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/00059

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D90/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 019 363 A (THYSSEN INDUSTRIE) 31 October 1979 (1979-10-31) page 1, paragraph 1; figure 1A ---	1,4,5,8
A	EP 0 321 009 A (PAKHOED CONTAINER SERVICES) 21 June 1989 (1989-06-21) column 2, line 32 - line 35; figure 2 ---	1,5
A	EP 0 367 275 A (GRAAFF KG) 9 May 1990 (1990-05-09) claim 1 -----	9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search

14 April 2000

Date of mailing of the international search report

28/04/2000

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter: nal Application No

PCT/GB 00/00059


Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2019363	A	31-10-1979	DE 2814089 A 04-10-1979
			FR 2421123 A 26-10-1979
			NL 7902499 A,B, 03-10-1979
			PL 214514 A 19-11-1979
			YU 74579 A 21-01-1983
EP 0321009	A	21-06-1989	NL 8703060 A 17-07-1989
EP 0367275	A	09-05-1990	DE 58909777 D 27-03-1997
			ES 2097739 T 16-04-1997
			JP 2166086 A 26-06-1990
			KR 9511763 B 10-10-1995

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P/23232.WO/CJW		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00059	International filing date (day/month/year) 12/01/2000	Priority date (day/month/year) 13/01/1999	
International Patent Classification (IPC) or national classification and IPC B65D90/08			
Applicant SEA CONTAINERS SERVICES LTD. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 12 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 10/08/2000		Date of completion of this report 11.04.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Philippon, D Telephone No. +49 89 2399 2617	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00059

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1	as originally filed			
2-9	as received on	11/01/2001	with letter of	08/01/2001

Claims, No.:

1-5	as received on	11/01/2001	with letter of	08/01/2001
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Drawings, sheets:

1/4-4/4	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00059

- ☐ the description, pages: ,
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-5
	No: Claims
Inventive step (IS)	Yes: Claims 1-5
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-5
	No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00059

Item I

1. The amendments filed with the letter dated 08/01/2001 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT:
 - 1.1. The feature introduced into claim 1 that the first return member is arranged at a location of the third portion remote from the angled second portion is broader in scope that the originally disclosed feature (see originally filed claim 3 and page 6, lines 19-22) that the return member is arranged at an edge of the third portion remote from the angled portion.
 - 1.2. The feature introduced into claim 1 that the second return member is arranged at a location remote from the angled second portion is not supported by the originally disclosed feature that the second return member (called web 6 in the description) is located proximate a junction between the vertical portion and the angled portion (see page 6, line 23 to page 7, line 1).
2. The same applies to the amendments in claim 3 for a container (corresponds to originally filed claim 5) and in claim 5 for a method (corresponds to originally filed claim 9).
3. This report, in particular Item V of this report, has been established as if these amendments had not been made (Rule 70.2(c)PCT) and had been replaced by the corresponding disclosed features.

Item V

3. A top rail according to the pre-characterising part of claim 1 is known from D1 = GB-A-2 019 363.

This rail has been improved by the provision of the first and second return members according to the characterising portion (see item I above). There is no hint in the available prior art to modify the rail disclosed in D1 in the claimed manner. The subject-matter of claim 1 thus involves an inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00059

For the same reasons also the subject-matter of claims 3 and 5 involves an inventive step (Article 33 PCT).

4. Claims 2 and 4 are dependent on claims 1 and 3 respectively and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Item VII

5. The objections based on Article 34(2)(b) PCT raised in point I above apply equally to the corresponding parts of the description.
6. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

addition, the protruding upper portion 104 of the rail 100 is liable to damage in collision with other containers during the stacking of containers. Despite these difficulties, there is a strong prejudice in the art towards the riveting of panels to rails, in particular, in the case of aluminum rails and panels.

5

It is an object of this invention to provide an improved top rail for an insulated freight container and an improved method of manufacturing such a freight container.

10 According to one aspect of this invention there is provided a top rail for an insulated double-skinned freight container, the rail being for forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the outer skin of the side wall, an angled second portion at a first obtuse angle to the first portion
15 and adapted to be angled inwardly of the container in use and a third portion for attachment to the outer skin of the roof panel angled at a second obtuse angle to the angled second portion so that the third portion is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer skin of the roof panel, characterised by a first return
20 member arranged to be substantially perpendicular to the third portion at a location of the third portion remote from the angled second portion and a second return member arranged substantially perpendicular to the first portion at a location remote from the angled second portion, said first and second return members being disposed

inwardly of the container in use to reduce flexing in a vertical direction and axial twisting of said rail and wherein the rail is formed of aluminium.

Conveniently the first obtuse angle is between 140 degrees and 160 degrees.

5

According to a second aspect of this invention, there is provided an insulated freight container having a top rail, the top rail forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the outer skin of the side wall, an
10 angled second portion which is angled at a first obtuse angle to the first portion and angled inwardly of the container and a third portion attached to the outer skin of the roof and angled at a second obtuse angle to the angled second portion so that the third portion is substantially perpendicular to the first portion and the rail is welded to at least one of the outer skin of the side wall and the outer skin of the roof panel,
15 characterised by a first return member arranged to be substantially perpendicular to the third portion at a location of the third portion remote from the angled second portion and a second return member arranged substantially perpendicular to the first portion at a location remote from the angled second portion, said first and second return members being disposed inwardly of the container in use to reduce flexing in
20 a vertical direction and axial twisting of said rail and wherein the rail and the outer skin of the roof panel and/or the outer skin of the side panel are of aluminium.

Conveniently, the first obtuse angle is between 140 degrees and 160 degrees.

According to a third aspect of this invention there is provided a method of manufacturing an insulated double-skinned freight container comprising the steps of:

- a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of the floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,
- d) providing outer skins and inner skins of side panels, locating the inner skins parallel to the respective outer skins and spaced from them by foam spacing stanchions, inserting foam between the inner and outer skins,
- e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling joints between the floor panel and side panels with foam,
- f) providing aluminium top rails having a first portion for attachment to each outer skin of each side wall respectively, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to an outer skin of a roof panel, angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion, and having a first return member arranged substantially perpendicular to the third portion at a location of the third portion remote from the angled second portion and a second return member arranged substantially perpendicular to the first portion at a location remote from the angled second portion, said first and second return members being disposed inwardly of the container in use to reduce flexing in a vertical direction and axial twisting of said rail.

- g) riveting said top rails to the outer skins of the side walls respectively, fixing with a known method an inner skin of the roof panel to the inner skins of the side walls respectively,
- h) welding an outer skin of the roof panel to the third portion of the top rail and filling the space between the inner and outer skins of the roof panel with foam, wherein said return members are located in said foam and substantially prevent flexing of the rail in a vertical direction and axial twisting of said rail.

The rail of the present invention has the advantage of providing added strength and providing greater protection to the top rail from impact damage than rails of the prior art since the rail has no protruding portion. The top rail of the invention also has a smaller total cross section area than the rails of the prior art, but with the material concentrated where the greatest strength is required, i.e. on the angled section. The use of a welded joint also avoids weakening the outer skin by riveting, and reduces the likelihood of the ingress of water into the insulation foam.

The invention will now be described by way of example with reference to the accompanying drawing in which ;

Figure 1 shows a prior art transverse cross-section of a top rail installed in a container,

Figure 2 shows a transverse cross-section of a top rail according to the invention, installed in a container,

Figure 3 shows a perspective view of the top rail of Figure 2 installed in a

container,

Figure 4 shows a transverse cross-section of an alternative embodiment of the top rail according to the invention installed in a container,

Figure 5 shows an enlarged view of a transverse cross-section of the top rail of Figures 2 & 3, and

Figure 6 shows an enlarged view of a transverse cross-section of the top rail of Figure 4.

In the figures like reference numerals denote like parts.

An aluminium top rail 1 shown in transverse cross-section in Figure 2 has a first vertical portion 2, a second angled portion 3 angled inwards of the container in use at an angle α of 150 degrees to the first portion and third horizontal portion 4 connected at an angle β of 120 degrees of the angled portion 3 and oriented at right angles to the vertical portion 2. The first, second and third portions 2, 3, 4 of the rail 1 thereby form a chamfered right angle. The third portion 4 is provided with a return portion 5 connected by an edge of the return portion 5 to an edge of the third portion 4 remote from the second angled portion 3, the return portion 5 being at right angles to the third portion 4 and inward of the container in use.

The vertical portion 2 is provided with a web 6 perpendicular to the vertical portion 2 and located on the vertical portion 2 proximate a junction between the vertical portion 2 and the angled portion 3 and inward of the container in use.

As can be seen in the enlarged drawings of figures 5 or 6, the vertical

portion 2 is further provided with lower, median and upper horizontal ribs 7, 8, 9, at upper and lower edges of the portion 2 and substantially along a median line of the portion 2 on an outer surface of the rail 1. The inner surface of the vertical section 2 is provided with a cut-away portion 10 extending substantially from a position opposite the lower rib 7 to a position opposite the median rib 8, for receiving an outer skin 11 of a side panel 12.

The third portion 4 may also be provided with a longitudinal bead 13, raised above an outer surface of the portion 4 at a junction between the portion 4 and the angled portion 3.

In the manufacture of a freight container using the top rail 1 of the invention, the floor and side panels are constructed from inner and outer skins 16, 11 with foam 15 in the interstitial space between the skins in a manner known per se, the inner and outer skins being placed parallel with each other, separated by foam stanchions and the interstitial space being injected with foam 15 so that the inner and outer skins 16, 11 are held together by the foam 15 when the foam sets. The top rail 1 is riveted to the outer skin 11 of the side panel 12, the outer skin 11 of the side panel 12 being accommodated in the cut-away 10 in the inner surface of the vertical section 2. An inner skin 17 of the top panel 14 is attached to the inner skin 16 of the side panels in a known manner and the outer skin 18 is welded to the top rail 1 by a weld bead 20 or with an edge of the outer skin 18 abutting the longitudinal bead 13 where present, secured by a weld bead 19, with the outer skin 18 partially overlapping the horizontal section 4. The interstitial space between the outer and

inner skins 18, 17 of the top panel 14 is injected with foam 15 so that the return portion 5 of the top rail 1 and the web 6 are embedded in the set foam 15.

Although it is normally more efficient to weld the top panel 14 to the rail 1, it will be understood that the outer skin of the top panel 14 could be riveted to the rail 1 and the outer skin 11 of the side panel 12 welded to the rail 1, or both panels 12 and 14 could be welded to the rail 1. Instead of welding, a suitable adhesive may be used.

The return section 5 and the web 6 impart strength to the rail 1 in axial twisting so that the rail 1 according to the invention is stronger than the rails of the prior art in relation to flexing in a vertical direction and equally strong in respect of axial twisting. The web 6 also forms a convenient boundary for an initial insertion of foam within the side wall before the top panel is assembled to the rail, and a final foaming of the corner between the side wall and the top panel. In addition, the web 6 facilitates molding in the manufacture of the rail 1.

A second embodiment of the invention is shown in the transverse cross-section in Figure 4, in this embodiment the portion 4 is not provided with a bead and the weld bead 20 overlaps the edge of the outer skin of the top panel, the top panel partially overlapping the portion 4 of the rail 1.

The strengthening ribs 7,8,9 of the vertical portion 2 provide strength against side impacts and the angled portion 3 of the rail assists in glancing off impacting

containers in collisions during stacking.

The total cross-sectional area of the rail of the invention is less than the total cross-section area of rails of the prior art and therefore less material is used in the construction of the rail and yet the strength is concentrated in the angled section where damage is mostly likely to occur. Additional strength is provided by the strengthening ribs 7,8,9 on the vertical section 2 and by the web 6 and the return portion 5.

CLAIMS:

1. A top rail (1) for an insulated double-skinned freight container, the rail being for forming a junction between an outer skin (11) of a side wall and an outer skin (18) of a roof panel of the container, wherein the rail comprises a first portion (2) for attachment to the outer skin (11) of the side wall, an angled second portion (3) at a first obtuse angle (α) to the first portion and adapted to be angled inwardly of the container in use and a third portion (4) for attachment to the outer skin (18) of the roof panel angled at a second obtuse angle (β) to the angled second portion (3) so that the third portion (4) is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer skin of the roof panel, characterised by a first return member (5) arranged to be substantially perpendicular to the third portion (4) at a location of the third portion remote from the angled second portion (3) and a second return member (6) arranged substantially perpendicular to the first portion (2) at a location remote from the angled second portion (3), said first and second return members (5,6) being disposed inwardly of the container in use to reduce flexing in a vertical direction and axial twisting of said rail and wherein the rail is formed of aluminium.
2. A top rail as claimed in any of the preceding claims, wherein the first obtuse angle (λ) is between 140 degrees and 160 degrees.
3. An insulated freight container having a top rail (1), the top rail forming a junction between an outer skin (11) of a side wall and an outer skin (18) of a roof panel of the container, wherein the rail comprises a first portion (2) for attachment

to the outer skin of the side wall, an angled second portion (3) which is angled at a first obtuse angle (α) to the first portion (2) and angled inwardly of the container and a third portion (4) attached to the outer skin of the roof and angled at a second obtuse angle (β) to the angled second portion (3) so that the third portion (4) is substantially perpendicular to the first portion (2) and the rail (1) is welded to at least one of the outer skin (11) of the side wall and the outer skin (18) of the roof panel, characterised by a first return member (5) arranged to be substantially perpendicular to the third portion (4) at a location of the third portion remote from the angled second portion (3) and a second return member (6) arranged substantially perpendicular to the first portion (2) at a location remote from the angled second portion (3), said first and second return members (5,6) being disposed inwardly of the container in use to reduce flexing in a vertical direction and axial twisting of said rail and wherein the rail and the outer skin of the roof panel and/or the outer skin of the side panel are of aluminium.

15

4. An insulated freight container as claimed in claim 3, wherein the first obtuse angle (λ) is between 140 degrees and 160 degrees.

5. A method of manufacturing an insulated double-skinned freight container comprising the steps of:

20

- a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of the floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,

- d) providing outer skins (11) and inner skins (16) of side panels, locating the inner skins parallel to the respective outer skins and spaced from them by foam spacing stanchions, inserting foam (15) between the inner and outer skins,
- 5 e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling joints between the floor panel and side panels with foam,
- f) providing aluminium top rails (1) having a first portion (2) for attachment to each outer skin (11) of each side wall respectively, an angled second portion
10 (3) at a first obtuse angle (α) to the first portion (2) and adapted to be angled inwardly of the container in use and a third portion (4) for attachment to an outer skin (18) of a roof panel, angled at a second obtuse angle (β) to the angled portion (3) so that the third portion (4) is substantially perpendicular to the first portion (2), and having a first return member arranged
15 substantially perpendicular to the third portion at a location of the third portion remote from the angled second portion (3) and a second return member (6) arranged substantially perpendicular to the first portion (2) at a location remote from the angled second portion, said first and second return members (5,6) being disposed inwardly of the container in use to reduce
20 flexing in a vertical direction and axial twisting of said rail.
- g) riveting said top rails (1) to the outer skins (11) of the side walls respectively, fixing with a known method an inner skin (17) of the roof panel to the inner skins (16) of the side walls respectively,
- h) welding an outer skin (18) of the roof panel to the third portion (4) of the top

rail (1) and filling the space between the inner and outer skins (17,18) of the roof panel with foam (15), wherein said return members (5,6) are located in said foam (15) and substantially prevent flexing of the rail (1) in a vertical direction and axial twisting of said rail.

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In addition, the protruding upper portion 104 of the rail 100 is liable to damage in collision with other containers during the stacking of containers. Despite these difficulties, there is a strong prejudice in the art towards the riveting of panels to rails, in particular, in the case of aluminum rails and panels.

5

It is an object of this invention to provide an improved top rail for an insulated freight container and an improved method of manufacturing such a freight container.

10 According to one aspect of this invention there is provided a top rail for an insulated double-skinned freight container, the rail in use forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container; said top rail comprising a first portion for attachment to the side wall, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly
15 of the container in use, and a third portion for attachment to the roof panel angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer skin of the roof panel.

20 Advantageously, the rail is made of aluminium.

Conveniently, the top rail has a return section substantially perpendicular to the third portion at an edge of the third portion remote from the angled portion, the

return section being adapted to be disposed inwardly of the container in use.

Advantageously, the first obtuse angle is between 140 degrees and 160 degrees.

5 Advantageously, the top rail has a web perpendicular to the first portion and attached to the first portion, the web being adapted to be disposed inwardly of the container in use.

10 Conveniently, an outer surface of the third portion is provided with a longitudinal bead against which the outer skin of the roof panel abuts to provide a welding edge.

 According to a second aspect of this invention, there is provided an insulated freight container having a top rail, the top rail forming a junction between an outer
15 skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the side wall, an angled second portion which is angled at a first obtuse angle to the first portion and angled inward of the container, and a third portion attached to the roof and angled at a second obtuse angle to the angled portion so that the third portion is substantially
20 perpendicular to the first portion and the rail is welded to at least one of the outer skin of the side panel and the outer skin of the roof panel.

 Conveniently, the rail and/or the outer skin of the side panel and/or the outer skin of the roof panel are of aluminium.

Advantageously, the top rail has a return section substantially perpendicular to the third portion located at an edge of the third portion remote from the angled portion and disposed inwardly of the container.

5

Advantageously, the top rail has a web perpendicular to the first portion and attached to the first portion, the web being adapted to be disposed inwardly of the container in use.

10 Conveniently, the first obtuse angle is between 140 degrees and 160 degrees.

According to a third aspect of the present invention there is provided a method of manufacturing an insulated double-skinned freight container comprising the steps of:

- 15 a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of a floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,
- d) providing outer and inner skins of side panels, locating the inner skins
20 parallel to the respective outer skin and spaced from them by foam spacing stanchions, inserting foam between the inner and outer skins,
- e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling with foam joints between the floor panel and side panels,

- f) providing top rails having a first portion for attachment to each side wall respectively, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to a roof panel, angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion,
- g) riveting said top rails to the outer skins of the side walls respectively, fixing with a known method an inner skin of the roof panel to the inner skins of the side walls respectively,
- h) welding an outer skin of the roof panel to the third portion of the top rail and filling the space between the inner and outer skins of the roof panel with foam.

The rail of the present invention has the advantage of providing added strength and providing greater protection to the top rail from impact damage than rails of the prior art since the rail has no protruding portion. The top rail of the invention also has a smaller total cross section area than the rails of the prior art, but with the material concentrated where the greatest strength is required, i.e. on the angled section. The use of a welded joint also avoids weakening the outer skin by riveting, and reduces the likelihood of the ingress of water into the insulation foam.

The invention will now be described by way of example with reference to the accompanying drawing in which ;

Figure 1 shows a prior art transverse cross-section of a top rail installed in a

container,

Figure 2 shows a transverse cross-section of a top rail according to the invention, installed in a container,

Figure 3 shows a perspective view of the top rail of Figure 2 installed in a
5 container,

Figure 4 shows a transverse cross-section of an alternative embodiment of the top rail according to the invention installed in a container,

Figure 5 shows an enlarged view of a transverse cross-section of the top rail of Figures 2 & 3, and

10 Figure 6 shows an enlarged view of a transverse cross-section of the top rail of Figure 4.

In the figures like reference numerals denote like parts.

The top rail 1 shown in transverse cross-section in Figure 2 has a first
15 vertical portion 2, a second angled portion 3 angled inwards of the container in use at an angle α of 150 degrees to the first portion and third horizontal portion 4 connected at an angle β of 120 degrees of the angled portion 3 and oriented at right angles to the vertical portion 2. The first, second and third portions 2, 3, 4 of the rail 1 thereby form a chamfered right angle. The third portion 4 is provided with a
20 return portion 5 connected by an edge of the return portion 5 to an edge of the third portion 4 remote from the second angled portion 3, the return portion 5 being at right angles to the third portion 4 and inward of the container in use.

The vertical portion 2 is provided with a web 6 perpendicular to the vertical portion 2 and located on the vertical portion 2 proximate a junction between the

vertical portion 2 and the angled portion 3 and inward of the container in use.

As can be seen in the enlarged drawings of figures 5 or 6, the vertical portion 2 is further provided with lower, median and upper horizontal ribs 7, 8, 9, at upper and lower edges of the portion 2 and substantially along a median line of the portion 2 on an outer surface of the rail 1. The inner surface of the vertical section 2 is provided with a cut-away portion 10 extending substantially from a position opposite the lower rib 7 to a position opposite the median rib 8, for receiving an outer skin 11 of a side panel 12.

The third portion 4 may also be provided with a longitudinal bead 13, raised above an outer surface of the portion 4 at a junction between the portion 4 and the angled portion 3.

In the manufacture of a freight container using the top rail 1 of the invention, the floor and side panels are constructed from inner and outer skins 16, 11 with foam 15 in the interstitial space between the skins in a manner known per se, the inner and outer skins being placed parallel with each other, separated by foam stanchions and the interstitial space being injected with foam 15 so that the inner and outer skins 16, 11 are held together by the foam 15 when the foam sets. The top rail 1 is riveted to the outer skin 11 of the side panel 12, the outer skin 11 of the side panel 12 being accommodated in the cut-away 10 in the inner surface of the vertical section 2. An inner skin 17 of the top panel 14 is attached to the inner skin 16 of the side panels in a known manner and the outer skin 18 is welded to the top rail 1

by a weld bead 20 or with an edge of the outer skin 18 abutting the longitudinal bead 13 where present, secured by a weld bead 19, with the outer skin 18 partially overlapping the horizontal section 4. The interstitial space between the outer and inner skins 18, 17 of the top panel 14 is injected with foam 15 so that the return
5 portion 5 of the top rail 1 and the web 6 are embedded in the set foam 15.

Although it is normally more efficient to weld the top panel 14 to the rail 1, it will be understood that the outer skin of the top panel 14 could be riveted to the rail 1 and the outer skin 11 of the side panel 12 welded to the rail 1, or both panels
10 12 and 14 could be welded to the rail 1. Instead of welding, a suitable adhesive may be used.

The return section 5 and the web 6 impart strength to the rail 1 in axial twisting so that the rail 1 according to the invention is stronger than the rails of the
15 prior art in relation to flexing in a vertical direction and equally strong in respect of axial twisting. The web 6 also forms a convenient boundary for an initial insertion of foam within the side wall before the top panel is assembled to the rail, and a final foaming of the corner between the side wall and the top panel. In addition, the web 6 facilitates molding in the manufacture of the rail 1.

20

A second embodiment of the invention is shown in the transverse cross-section in Figure 4, in this embodiment the portion 4 is not provided with a bead and the weld bead 20 overlaps the edge of the outer skin of the top panel, the top

panel partially overlapping the portion 4 of the rail 1.

The strengthening ribs 7,8,9 of the vertical portion 2 provide strength against side impacts and the angled portion 3 of the rail assists in glancing off impacting
5 containers in collisions during stacking.

The total cross-sectional area of the rail of the invention is less than the total cross-section area of rails of the prior art and therefore less material is used in the construction of the rail and yet the strength is concentrated in the angled section
10 where damage is mostly likely to occur. Additional strength is provided by the strengthening ribs 7,8,9 on the vertical section 2 and by the web 6 and the return portion 5.

CLAIMS:

1. A top rail for an insulated double-skinned freight container, the rail being for forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to
5 the side wall, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to the roof panel angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion, the rail being adapted to be welded to at least one of the outer skin of the side panel and the outer
10 skin of the roof panel.
2. A top rail as claimed in claim 1, wherein the rail is made of aluminium.
3. A top rail as claimed in claims 1 or 2, wherein the top rail has a return
15 section substantially perpendicular to the third portion at an edge of the third portion remote from the angled portion, the return section being adapted to be disposed inwardly of the container in use.
4. A top rail as claimed in any of the preceding claims, wherein the first obtuse
20 angle is between 140 degrees and 160 degrees.
5. An insulated freight container having a top rail, the top rail forming a junction between an outer skin of a side wall and an outer skin of a roof panel of the container, wherein the rail comprises a first portion for attachment to the side wall,

an angled second portion which is angled at a first obtuse angle to the first portion and angled inward of the container and a third portion attached to the roof and angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion and the rail is welded to at least one of
5 the outer skin of the side panel and the outer skin of the roof panel.

6. An insulated freight container as claimed in claim 5, wherein the rail and/or the outer skin of the side panel and/or the outer skin of the roof panel are of aluminium.
10

7. An insulated freight container as claimed in claim 5 or 6, wherein the top rail has a return section substantially perpendicular to the third portion located at an edge of the third portion remote from the angled portion and disposed inwardly of the container.
15

8. An insulated freight container as claimed in any of the claims 5 to 7, wherein the first obtuse angle is between 140 degrees and 160 degrees.

9. A method of manufacturing an insulated double-skinned freight container
20 comprising the steps of:

- a) providing an outer and inner skin of a floor panel,
- b) locating the inner skin of the floor panel parallel to and spaced from the outer skin by foam spacing stanchions,
- c) injecting foam between the inner and outer skins,

- d) providing outer and inner skins of side panels, locating the inner skins parallel to the respective outer skin and spaced from them by foam spacing stanchions, inserting foam between the inner and outer skins,
- e) fixing an edge of the side panels to the floor panel by a known method to form side walls of the container and filling with foam joints between the floor panel and side panels,
- f) providing top rails having a first portion for attachment to each side wall respectively, an angled second portion at a first obtuse angle to the first portion and adapted to be angled inwardly of the container in use and a third portion for attachment to a roof panel, angled at a second obtuse angle to the angled portion so that the third portion is substantially perpendicular to the first portion,
- g) riveting said top rails to the outer skins of the side walls respectively, fixing with a known method an inner skin of the roof panel to the inner skins of the side walls respectively,
- h) welding an outer skin of the roof panel to the third portion of the top rail and filling the space between the inner and outer skins of the roof panel with foam.